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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/668,976 | 09/23/2003 | Robert Scott Morris | 30408-102 | 1763 |

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| EXAMINER | |
|---|---|
| CHUO, TONY SHENG HSIANG | |
| ART UNIT | PAPER NUMBER |
| 1745 | |

DATE MAILED: 11/03/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/668,976 | MORRIS ET AL. | |
| | Examiner | Art Unit | |
| | Tony Chuo | 1745 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *02 October 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-23* is/are pending in the application.

4a) Of the above claim(s) *18* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-17 and 19-23* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *19 July 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *12/9/05*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

## DETAILED ACTION

### *Election/Restrictions*

1. Applicant's election with traverse of Species 2, single-walled nanotubes in the reply filed on 10/2/06 is acknowledged. The traversal is on the ground(s) that species 1 and species 2 do not have distinct chemical structures. The examiner agrees with the applicant. Therefore, species 1 and 2 will be examined together. Claim 18 has been withdrawn from further consideration being drawn to a non-elected species.

### *Priority*

2. The later-filed application must be an application for a patent for an invention which is also disclosed in the prior application (the parent or original nonprovisional application or provisional application). The disclosure of the invention in the parent application and in the later-filed application must be sufficient to comply with the requirements of the first paragraph of 35 U.S.C. 112. See *Transco Products, Inc. v. Performance Contracting, Inc.*, 38 F.3d 551, 32 USPQ2d 1077 (Fed. Cir. 1994).

The disclosure of the prior-filed application, Application No. 60/471,780, fails to provide adequate support or enablement in the manner provided by the first paragraph of 35 U.S.C. 112 for one or more claims of this application. Claims 6, 8, 14-16, 19, and 21-23 are not supported by the disclosure of application no. 60/471,780. Therefore, the earlier priority date for claims 6, 8, 14-16, 19, and 21-23 is not granted.

### *Information Disclosure Statement*

3. The information disclosure statement (IDS) submitted on 12/9/05 was filed on 12/9/05. The submission is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

### *Drawings*

4. The drawing filed on 7/19/04 are accepted by the examiner.

### *Claim Rejections - 35 USC § 112*

5. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

6. Claim 1-17 and 19-23 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. It is unclear how an anode is in electrical communication with a cathode because if the anode was in electrical communication with the cathode, there would be an electrical short circuit between the electrodes. It is also unclear how an anode and cathode can be comprised of a single carbon nanotube. It is also unclear how an anode and a cathode can function as a battery if neither of the electrodes are lithiated.

7. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

8. Claim 1-17 and 19-23 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. It is unclear how an anode and cathode can be comprised of a single carbon nanotube.

9. Claim 6 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. It is unclear what type of electrolyte is a PEP electrolyte.

***Claim Rejections - 35 USC § 102***

10. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

11. Claims 1-3 and 5 are rejected under 35 U.S.C. 102(e) as being anticipated by Ochoa et al (US 2003/0099883). The Ochoa reference discloses a lithium-ion battery "10" comprising an anode "16", cathode "20", and a separator "18" between the anode and the cathode wherein single walled carbon nanotubes are added to the anode and cathode (See paragraphs [0008],[0009]). Examiner's note: Claim 1 is interpreted as a

battery comprising carbon nanotubes in both the anode and the cathode wherein the carbon nanotubes do not have to be active materials. In addition, it is implicit from the teachings of Ochoa et al that the separator comprises a lithium salt electrolyte. Otherwise, the battery would not function as a lithium-ion battery.

***Claim Rejections - 35 USC § 103***

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

13. Claims 4 and 7-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ochoa et al (US 2003/0099883) in view of Zhou et al (US 6422450). The Ochoa reference is applied to claims 1-3 for reasons stated above. However, Ochoa et al does not expressly disclose a single-walled nanotube that is charged up to $Li_1C_3$; a carbon nanotube that has a reversible capacity in excess of 600 mAh/g; a carbon nanotube saturation that is $MC_8$ wherein M is selected from the group consisting of K, Rb, and Cs; carbon nanotubes that are lithiated; and anode that is a $LiC_3$ anode. The Zhou reference discloses a lithiated purified single-walled nanotube that is formed as a battery electrode "48" that has a reversible capacity of approximately 650 mAh/g (equivalent to $Li_{1.7}C_6$) (See column 5, lines 44-67). In addition, it also discloses reversible capacity that can be further increased to levels of 900-1000 mAh/g (See column 5, lines 65-67). Examiner's note: It is implicit from the teachings of Zhou et al

that if the reversible capacity is increased to greater than 650 mAh/g, then the single-walled nanotube can be charged up to $Li_1C_3$. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Ochoa battery to include a single-walled nanotube that is charged up to $Li_1C_3$; a carbon nanotube that has a reversible capacity in excess of 600 mAh/g; a carbon nanotube saturation that is $MC_8$ wherein M is selected from the group consisting of K, Rb, and Cs; carbon nanotubes that are lithiated; and anode that is a $LiC_3$ anode in order to utilize a material that has improved properties that make it useful in batteries and other high energy applications.

14. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ochoa et al (US 2003/0099883) in view of Chaloner-Gill (US 5521025). The Ochoa reference is applied to claims 1 and 5 for reasons stated above. However, the reference does not expressly disclose a PEP electrolyte. The Chaloner-Gill reference discloses a polyphosphate electrolyte that is compatible for use in an electrochemical cell comprising a lithium containing anode (See column 3, lines 32-34 and column 6, lines 3-4). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Ochoa battery to include a PEP electrolyte in order to utilize an electrolyte that has improved properties of ionic conductivity and mechanical strength without the necessity of a separate curing step.

15. Claim 11-15 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ochoa et al (US 2003/0099883) in view of Chen et al (US 7060390). The Ochoa reference is applied to claim 1 for reasons stated above. In addition, the Ochoa

reference discloses single-walled nanotubes that are essentially pure nanotube material (See paragraph [0009]). However, Ochoa et al does not expressly disclose a cathode comprising single-walled nanotubes and an anode comprising multi-walled nanotubes that are lithiated; anode comprising lithiated single walled nanotubes and cathode comprising single-walled nanotubes doped in a lithium metal oxide that is $LiNiCoO_2$; or anode comprising single-walled nanotubes and cathode comprising $LiNiCoO_2$. The Chen reference discloses a lithium ion battery comprising a cathode comprising lithium doped transition metal alloy oxides represented by the formula $Li_xCo_yNi_zO_2$ and an anode comprising a plurality of multi-walled carbon nanotubes (See column 2, lines 34-45). Examiner's note: Depending on whether the battery is in a charge or discharge state, either the anode or the cathode would be lithiated. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Ochoa battery to include a cathode comprising single-walled nanotubes and an anode comprising multi-walled nanotubes that are lithiated; anode comprising lithiated single walled nanotubes and cathode comprising single-walled nanotubes doped in a lithium metal oxide that is $LiNiCoO_2$; or anode comprising single-walled nanotubes and cathode comprising $LiNiCoO_2$ in order to utilize nanomaterials that have high charge capacity because lithium ions are able to intercalate not only inside the mult-walled carbon nanotubes, but also in the interstices between adjacent multi-walled carbon nanotubes.

16. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ochoa et al (US 2003/0099883) in view of Ogura et al (US 2002/0061441). The Ochoa

reference is applied to claim 1 for reasons stated above. However, Ochoa et al does not expressly disclose single-walled nanotubes that have been treated with a gas selected from the group consisting of $CO_2$, CO, $NO_2$, NO, $N_2O$, $O_2$, peroxides, $O_3$, $SO_2$, and $CH_2CO$. The Ogura reference discloses chemical treatments of carbon nanotubes that are used for electrodes in a lithium battery that include oxidation with ozone (See paragraph [0046]). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Ochoa battery to include single-walled nanotubes that have been treated with a gas selected from the group consisting of $CO_2$, CO, $NO_2$, NO, $N_2O$, $O_2$, peroxides, $O_3$, $SO_2$, and $CH_2CO$ in order to disentangle the aggregates of carbon nanotubes and facilitate the manufacture of a battery electrode.

17. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ochoa et al (US 2003/0099883) in view of Peng et al (Nanoletters, 1, pages 625-629 (2001)). The Ochoa reference is applied to claim 1 for reasons stated above. However, Ochoa et al does not expressly disclose a cathode comprising fluorinated single-walled nanotubes. The Peng reference discloses fluorinated single-walled nanotubes that are used as cathode materials in a lithium cell (See Abstract). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Ochoa battery to include a cathode comprising fluorinated single-walled nanotubes in order to increase the cell potential and improve the overall cell performance.

18. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ochoa et al (US 2003/0099883) in view of Chen et al (US 2003/0077515). The Ochoa reference is applied to claim 1 for reasons stated above. However, Ochoa et al does not expressly disclose an anode comprising a conducting polymer doped single walled nanotubes. The Chen reference discloses an electronically conductive polymer/carbon nanotube composites that are used in energy storage devices such as secondary batteries (See paragraph [0001]). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Ochoa battery to include an anode comprising a conducting polymer doped single walled nanotubes in order to provide a faster ionic charge transfer that is beneficial to increasing the power density of the battery.

19. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ochoa et al (US 2003/0099883) in view of Geronov (US 6344293). The Ochoa reference is applied to claim 1 for reasons stated above. However, Ochoa et al does not expressly disclose an electrolyte that is a non-flammable polyether phosphate liquid together with a lithium salt. The Geronov reference discloses liquid electrolyte solvents that include polyethers and phosphate esters that also include a lithium salt (See column 5 line 66 to column 6 line 35). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Ochoa battery to include a non-flammable polyether phosphate liquid together with a lithium salt in order to increase the cycle life of the secondary electrochemical cell.

20. Claims 22-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ochoa et al (US 2003/0099883) in view of Yang et al (Electrochemical and Solid State Letters, 6(8), pp. A154-A156 (August 2003)). The Ochoa reference is applied to claim 1 for reasons stated above. However, Ochoa et al does not expressly disclose an anode comprising a lithium composite that is LiSiC. The Yang reference discloses a Si/C composite as a lithium storage material for anodes for lithium ion cells (See Abstract). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Ochoa battery to include an anode comprising a lithium composite that is LiSiC in order to provide major capacity for lithium insertion by incorporating silicon.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tony Chuo whose telephone number is (571) 272-0717. The examiner can normally be reached on M-F, 8:30AM to 5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's trainer, Susy Tsang-Foster can be reached on (571) 272-1293. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only.

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TC

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PRIMARY EXAMINER